WHAT IS CLAIMED IS:

1. A photo-ionization detector (PID) comprising:

a microprocessor; and

a gas detection unit that measures a current corresponding to a concentration of a volatile gas in an ambient gas, wherein the gas detection unit comprises:

an ionization chamber, through which the ambient gas flows;

a UV lamp that ionizes the ambient gas in the ionization chamber;

a bias electrode that is biased to repel positive ions resulting from the ionization of the ambient gas; and

a measurement electrode that is biased to attract positive ions resulting from the ionization of the ambient gas,

wherein the microprocessor controls the gas detection unit such that a flow of the ambient gas in the ionization chamber is intermittently interrupted, wherein the UV lamp converts oxygen in the closed ambient gas to ozone.

2. The PID of claim 1, further comprising a container coupled to the ionization chamber, the container including an oxygen-containing gas, wherein the oxygen-containing gas is supplied into the ionization chamber when the flow of the ambient gas is interrupted in the ionization chamber, so that the oxygen-containing gas is converted to ozone.

3. The PID of claim 1, further comprising a pump coupled to the ionization chamber, wherein the microprocessor intermittently closes the flow of the ambient gas in the ionization chamber by turning on and off the pump.

4. The PID of claim 3, further comprising a pump driver circuit coupled to the pump, wherein the microprocessor controls the pump driver circuit.

5. The PID of claim 3, wherein the pump is turned on and off every 0.5 second.

6. The PID of claim 1, further comprising:

a lamp driver circuit that drives the UV lamp;

a bias driver circuit that provides a first voltage to the bias electrode; and

a measurement driver circuit that provides a second voltage to the measurement electrode,

wherein the microprocessor controls the lamp driver circuit, the bias driver circuit, and the measurement driver circuit.

7. A photo-ionization detector (PID) comprising:

a microprocessor; and

a plurality of gas detection units, each of the plurality of gas detection units measuring a current corresponding to a concentration of a volatile gas in an ambient gas, wherein each of the plurality of the gas detection units comprises:

an ionization chamber, through which the ambient gas flows;

a UV lamp that ionizes the ambient gas in the ionization chamber;

a bias electrode that is biased to repel positive ions resulting from the ionization of the ambient gas; and

a measurement electrode that is biased to attract positive ions resulting from the ionization of the ambient gas,

wherein the microprocessor controls the plurality of gas detection units such that a flow of the ambient gas is prevented in the ionization chamber of at least one of the plurality of the gas detection units while the ambient gas flow through the ionization chamber of at least another one of the plurality of gas detection units is permitted, wherein the UV lamp converts oxygen in the closed ambient gas to ozone.

8. The PID of claim 7, further comprising a container coupled to the ionization chamber, the container including an oxygen-containing gas, wherein the oxygen-containing gas is supplied to the ionization chamber in which a flow of the ambient gas is prevented, so that the oxygen-containing gas is converted to ozone.

9. The PID of claim 7, further comprising a pump coupled to each of the plurality of gas detection units, the pump moving the ambient gas through the ionization chamber of the plurality of gas detection units.

10. The PID of claim 9, further comprising a pump driver circuit coupled to the pump, wherein the microprocessor controls the pump driver circuit.

11. The PID of claim 9, further comprising a multi-port valve coupled to the ionization chamber of each of the plurality of gas detection units, wherein the multi-port valve opens and closes the ionization chamber of each of the plurality of the gas detection units to the flow of the ambient gas.

12. The PID of claim 11, further comprising a valve driver circuit coupled to the multi-port valve, wherein the microprocessor controls the multi-port valve driver circuit.

13. The PID of claim 11, wherein the pump operates continuously.

14. The PID of claim 7, wherein the flow of ambient gas is permitted in the ionization chamber of one of the gas detection units from which contamination has been removed during a time when ambient gas is prevented from flowing in the ionization chamber of another of the gas detection units to permit cleaning the ionization chamber of the another.

15. The PID of claim 7, wherein each of the gas detection units has associated therewith

a lamp driver circuit that drives the UV lamp of the gas detection unit;

a bias driver circuit that provides a first voltage to the bias electrode of the gas detection unit; and

a measurement driver circuit that provides a second voltage to the measurement electrode of the gas detection unit,

wherein the microprocessor controls the lamp driver circuits, the bias driver circuits, and the measurement driver circuits.

16. A photo-ionization detector (PID) comprising:

a microprocessor;

a first gas detection unit; and

a second gas detection unit, each of the first and second gas detection units measuring a current corresponding to a concentration of a volatile gas in an ambient gas, wherein each of the first and second the gas detection units comprises:

an ionization chamber, through which the ambient gas flows;

a UV lamp that ionizes the ambient gas in the ionization chamber;

a bias electrode that is biased to repel positive ions resulting from the ionization of the ambient gas; and

a measurement electrode that is biased to attract positive ions resulting from the ionization of the ambient gas,

wherein the microprocessor controls the first and second gas detection units such that the ambient gas flows through the ionization chamber of one of the first and second gas detection units and the flow of the ambient gas is prevented in the ionization chamber of the other of the first and second gas detection units,

wherein the UV lamp converts oxygen in the other of the first and second gas detection units to ozone.

17. The PID of claim 16, further comprising a container coupled to the ionization chamber of the first and second gas detection units, the container including an oxygen-containing gas, wherein the oxygen-containing gas supplied to the ionization chamber in which ambient gas flow is prevented, so that the oxygen-containing gas is converted to ozone.

18. The PID of claim 16, further comprising a pump coupled to the first and second gas detection units, the pump providing the ambient gas flow through the ionization chambers of the gas detection units.

19. The PID of claim 18, further comprising a pump driver circuit coupled to the pump, wherein the microprocessor controls the pump driver circuit.

20. The PID of claim 16, further comprising a three-way valve coupled to the ionization chamber of each of the first and second gas detection units, wherein the three-way valve permits ambient gas flow in the ionization chamber of one or the other of the first and second gas detection units.

21. The PID of claim 20, further comprising a valve driver circuit coupled to the three-way valve, wherein the microprocessor controls the valve driver circuit to control the three-way valve.

22. The PID of claim 20, wherein the pump is connected to the three-way valve and operates continuously.

23. The PID of claim 16, wherein the flow of ambient gas is permitted in the ionization chamber of one of the first and second gas detection units from which contamination has been removed during a time when ambient gas is prevented from flowing in the ionization chamber of the other of the first and second gas detection units to permit cleaning the ionization chamber of the other.

24. The PID of claim 16, wherein each of the first and second gas detection units has associated therewith

a lamp driver circuit that drives the UV lamp of the gas detection unit;

a bias driver circuit that provides a first voltage to the bias electrode of the gas detection unit; and

a measurement driver circuit that provides a second voltage to the measurement electrode of the gas detection unit,

wherein the microprocessor controls the lamp driver circuits, the bias driver circuits, and the measurement driver circuits.

25. A method of real-time self-cleaning and measuring of a volatile gas concentration with a photo-ionization detector (PID) that comprises a gas detection unit including an ionization chamber in which an ambient gas including a volatile gas is ionized by a UV lamp, the method comprising:

causing ambient gas to flow through the ionization chamber, to permit the PID to measure the volatile gas concentration; and

causing the flow of the ambient gas through the ionization chamber and periodically interrupting the flow, wherein the flow is on for a first period of time and off for a second period of time, and further wherein during the second period of time the UV lamp converts oxygen contained in the ambient gas to ozone to remove contamination in the ionization chamber.

26. The method of claim 25, further comprising supplying an oxygen-containing gas into the ionization chamber.

27. The method of claim 25, wherein the first and second periods of time are each one-half second.

28. The method of claim 25, wherein the interruption of the flow of the ambient gas is achieved by turning on and off a pump connected to the ionization chamber.

29. A method of real-time self-cleaning and measuring of a volatile gas concentration with a photo-ionization detector (PID) that comprises a plurality of gas detection units, each of the plurality of gas detection units including an ionization chamber, in which an ambient gas including a volatile gas is ionized by a UV lamp, the method comprising:

flowing the ambient gas through the ionization chamber of one of the plurality of gas detection units

so that the PID measures the volatile gas concentration; and

stopping the flow of the ambient gas in the ionization chamber of another of the plurality of gas detection units so that the UV lamp converts oxygen contained in the ambient gas in the ionization chamber of the another gas detection unit to ozone, which removes contamination in the ionization chamber with the closed ambient gas,

wherein each of the plurality of gas detection units is repeatedly switched between flowing and stopping the ambient gas.

30. The method of claim 29, further comprising supplying an oxygen-containing gas into the ionization chamber in which the flow of ambient gas is stopped.

31. The method of claim 29, wherein the switch between the flowing and stopping of the flow of ambient gas is achieved by using a multi-port valve connected between a pump and the ionization chamber of each of the plurality of gas detection units.

32. A method of real-time self-cleaning and measuring of a volatile gas concentration with a photo-ionization detector (PID) that comprises a first gas detection unit and a second gas detection unit, each of the first and second gas detection units including an ionization chamber, in which an ambient gas including a volatile gas is ionized by a UV lamp, the method comprising:

flowing the ambient gas through the ionization chamber of the first gas detection unit, so that the PID measures the volatile gas concentration; and

stopping the ambient gas through the ionization chamber of the second gas detection unit so that the ambient gas is closed in the ionization chamber of the second gas detection unit while the ambient gas flows through the ionization chamber of the first gas detection unit, wherein the UV lamp converts oxygen contained in the ambient gas in the ionization chamber of the second gas detection unit to ozone, which removes contamination in the ionization chamber of the second gas detection unit,

wherein the flowing and stopping the ambient gas are repeatedly switched between the first and second gas detection units.

33. The method of claim 32, further comprising supplying an oxygen-containing gas into the ionization chamber in which the flow of ambient gas is stopped.

34. The method of claim 32, wherein the switch between the flowing and stopping of the flow of ambient gas is achieved by using a three-way valve connected between a pump and the ionization chamber of each of the first and second gas detection units.